CLAIMS

1. A method for producing a plated film, in which a film carrying means for carrying a film having a conductive surface, a cathode roll, and a plating bath arranged in the upstream and/or downstream side of the cathode roll and accommodated with a plating solution and an anode are used, wherein the film is carried by the film carrying means, the conductive surface of the film is brought into electrical contact with the cathode roll through a liquid layer, and passed through the plating bath for forming a plating layer on the conductive surface of the film, characterized in that the following relation is satisfied:

$$E_0 > [(I/Cs) \times d]/\sigma$$

where E_0 is the reduction potential of a metal constituting the plating layer; I is the value of a current flowing through the cathode roll for plating; Cs is the area of the conductive surface of the film in electrical contact with the cathode roll through the liquid layer; d is the thickness of a gap between the cathode roll and the conductive surface of the film; and σ is the conductivity of a liquid constituting the liquid layer.

2. A method for producing a plated film, according to claim 1, wherein the conductivity of the liquid constituting the liquid layer existing in the gap is controlled by means of the concentration of an electrolyte mainly composed of sulfuric acid.

3. A method for producing a plated film, according to claim 1, wherein the conductivity of the liquid constituting the liquid

layer existing in the gap is from 1 mS/cm to 100 mS/cm.

4. A method for producing a plated film, according to claim 1, wherein the thickness d of the gap is from 20 μm to 500 μm.

5. A method for producing a plated film, according to claim 4, wherein the thickness d of the gap is controlled by means of a carrying tension of the film.

6. A method for producing a plated film, according to claim 5, wherein the carrying tension of the film is from 10 N/m to 320 N/m.

7. A method for producing a plated film, according to claim 1, wherein the plating layer is composed of copper.

8. A method for producing a plated film, according to claim 1, wherein the film is made of a polyimide resin or polyester resin.

9. A method for producing a plated film, according to claim 1, wherein a material for constituting the plating layer and precipitated on a surface of the cathode roll is removed by means of a blade and/or an elastic body provided in contact with the surface of the cathode roll.

10. A method for producing a plated film, according to claim 9, wherein a liquid is supplied continuously or intermittently to at least one of the cathode roll, the blade and the elastic body.

11. A cathode roll for plating used for producing a plated film by a method, in which a film carrying means for carrying a film having a conductive surface, a cathode roll, and a plating bath arranged in the upstream and/or downstream side of the cathode

roll and accommodated with a plating solution and an anode are used in such a manner that while the film is carried by the film carrying means, the conductive surface of the film is brought into electrical contact with the cathode roll through a liquid layer, and passed through the plating bath for forming a plating layer on the conductive surface of the film, characterized in that the surface roughness Rmax of the cathode roll is 1 μm or less.

12. A cathode roll for plating used for producing a plated film by a method, in which a film carrying means for carrying a film having a conductive surface, a cathode roll, and a plating bath arranged in the upstream and/or downstream side of the cathode roll and accommodated with a plating solution and an anode are used in such a manner that while the film is carried by the film carrying means, the conductive surface of the film is brought into electrical contact with the cathode roll through a liquid layer, and passed through the plating bath for forming a plating layer on the conductive surface of the film, characterized in that the Vickers hardness of the surface of the cathode roll is 200 or more.

13. A cathode roll for plating, according to claim 11 or 12, which has a surface layer mainly composed of tungsten.

14. A cathode roll for plating, according to claim 11 or 12, which has a surface layer containing 50 wt% or more of tungsten and further containing at least one element selected from the group consisting of chromium, nickel and carbon.

15. A cathode roll for plating, according to claim 11 or 12, which has a surface layer containing 60 to 80 wt% of tungsten,

15 to 25 wt% of chromium, 1 to 10 wt% of nickel, and 1 to 10 wt% of carbon.

16. A cathode roll for plating, according to claim 11 or 12, which is treated on the surface by a thermal spraying method.

17. A cathode roll for plating, according to claim 16, wherein the thermal spraying method is a detonation flame spraying method.

18. A cathode roll for plating, according to claim 16, wherein the porosity of a thermally sprayed layer formed by surface treatment based on the thermal spraying method is 2% or less.

19. A method for producing a plated film, in which a film carrying means for carrying a film having a conductive surface, a cathode roll, and a plating bath arranged in the upstream and/or downstream side of the cathode roll and accommodated with a plating solution and an anode are used, wherein the film is carried by the film carrying means, the conductive surface of the film is brought into electrical contact with the cathode roll through a liquid layer, and passed through the plating bath for forming a plating layer on the conductive surface of the film, characterized in that the cathode roll is a cathode roll for plating as set forth in claim 11 or 12.

20. A method for producing a circuit board by forming a circuit pattern on a plated film, characterized in that the plated film is a plated film produced by the method for producing a plated film as set forth in any one of claims 1 to 10 or claim 19.